UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/585,834	07/12/2006	Patrick Le Bot	Serie 6485	7769

40582 7590 04/28/2009

AIR LIQUIDE
Intellectual Property
2700 POST OAK BOULEVARD, SUITE 1800
HOUSTON, TX 77056

EXAMINER	
PETTITT, JOHN F	

ART UNIT	PAPER NUMBER
3744	

MAIL DATE	DELIVERY MODE
04/28/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/585,834	LE BOT, PATRICK	
	Examiner	Art Unit	
	John F. Pettitt	3744	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 April 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *9-16* is/are pending in the application.

4a) Of the above claim(s) *12-16* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *9-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *07/12/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. **Claims 12-16** are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 04/07/2009.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. **Claims 9-11** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The recitation of claim 9 contains several deficiencies relative to presenting an antecedent basis for air streams, pressures, and reference to the double or triple column; for examination claim 9 will be assumed to read --A process for separating air by cryogenic distillation in an installation comprising a double or triple air separation column, **of which one medium-pressure column operates at a medium pressure**, and an exchange line in which: a) ~~all the~~ air is raised to a high pressure, optionally at least 5 bar above the medium pressure, and purified, optionally at **the** high pressure; b) one portion of the stream of purified air is cooled in the exchange line and is then divided into two fractions; c) each fraction is expanded in a turbine; d) intake pressure**s** of the two turbines **are** at least 5 bar above the medium pressure; e) **a** delivery pressure of at least one of the two turbines is substantially equal to the medium pressure; f) at least one portion of the air expanded in at least one of the

turbines is sent to the medium-pressure column of **the** double or triple column; g) a cold booster mechanically coupled to one of the expansion turbines takes in air, which has undergone cooling in the exchange line, and delivers the air at a temperature above **an** intake temperature **of at least one of the turbines**, and the **air delivered by the cold booster** is reintroduced into the exchange line in which at least one portion of the delivered air undergoes pseudo-condensation; h) at least one pressurized liquid coming from one of the columns undergoes pseudo-vaporization in the exchange line at a vaporization temperature, and i) the turbine not coupled to the cold booster is coupled to a booster followed by a cooler; and, optionally, j) **an** intake temperature of the cold booster is close to the ~~pseudo~~vaporization temperature of the liquid, wherein said installation includes, in addition to the double or triple column, a mixing column, and air coming from at least one of the turbines is sent to the mixing column, optionally after having passed through the medium-pressure column.--

Further, the recitation of claim 10 is assumed to read --in which the air sent to at least one of the turbines upstream of the mixing column comes from the booster ~~other than the cold booster~~ and leaves **the** booster at a pressure above the high pressure-- to enhance the simplicity of the claim.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. **Claims 9-11** are rejected under 35 U.S.C. 102(b) as being anticipated by Kunz et al. (DE 1 99 51 521 A1) hereafter Kunz. Kunz teaches a process for separating air by cryogenic distillation in an installation (Fig. 1 or 2) comprising a double air separation column (5, 14), of which one medium-pressure column (5) operates at a medium pressure, and an exchange line (3, 9) in which: a) air is raised to a high pressure (via compression not shown to provide 1), and purified (column 3, line 24); b) one portion of the stream of purified air (1) is cooled in the exchange line (3, 9) and is then divided into two fractions (21, 11); c) each fraction (21, 11) is expanded in a turbine (22, 12); d) intake pressures of the two turbines are at least 5 bar above the medium pressure (column 3, lines 50-60); e) a delivery pressure of at least one of the two turbines is substantially equal to the medium pressure (column 3, lines 55-60); f) at least one portion of the air expanded in at least one (22) of the turbines (22, 12) is sent to the medium-pressure column (5) of the double column (5, 14); g) a cold booster (7) mechanically coupled to one (12) of the expansion turbines (12, 22) takes in air, which has undergone cooling in the exchange line (3, 9), and delivers the air is at a temperature above an intake temperature of at least one (12) of the turbines (22, 12), and the air delivered by the cold booster (7) is reintroduced into the exchange line (3, 9) in which at least one portion of the delivered air undergoes pseudo-condensation (at least partial condensation, column 3, lines 35-40); h) at least one pressurized liquid (in 42 and/or 35) coming from one of the columns (5, 14) undergoes pseudo-vaporization (at least partial vaporization) in the exchange line (3, 9) at a vaporization temperature (column 4, lines 10-15), and i) the turbine (22) not coupled to the cold booster (7) is

coupled to a booster (18) followed by a cooler (19); and, optionally, j) an intake temperature of the cold booster (7) is close to the vaporization temperature of the liquid (in 42 and/or 35), wherein said installation (Fig 1-2) includes, in addition to the double column (5, 14), a mixing column (50), and air coming from at least one (22 or 12) of the turbines (22, 12) is sent to the mixing column (50 either via 5, 14 or via 7); the air sent to at least one of the turbines (12, 22) upstream of the mixing column (50) comes from the booster (18) and leaves the booster (18) at a pressure above the high pressure (in 1); air expanded in at least one of the turbines (22, 12) is sent to the bottom of the mixing column (50), in order to participate in mass exchange therein.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. **Claims 9-11** are rejected under 35 U.S.C. 103(a) as being unpatentable over Grenier et al. (US 5,475,980) hereafter Grenier (980) in view of Grenier (US 5,735,142)

hereafter Grenier (142). Grenier (980) teaches a process (Fig. 4) for separating air by cryogenic distillation in an installation comprising a double air separation column (1), of which one medium-pressure column (2) operates at a medium pressure, and an exchange line (4) in which: a) air is raised to a high pressure (not shown - column 6, lines 6); b) one portion (all air entering 4 on left of Fig. 4) of the air is cooled in the exchange line (4) and is then divided into two fractions (that which exits 4 to 8 and 32 hereafter “8a” for stream entering 8 and “32a” for stream entering 32); c) each fraction (8a, 32a) is expanded in a turbine (8, 32); d) intake pressures of the two turbines (8, 32) are at least 5 bar above the medium pressure (column 6, lines 5-20); e) a delivery pressure (exit pressure) of at least one of the two turbines (8, 32) is substantially equal to the medium pressure (column 6, lines 21-22); f) at least one portion of the air expanded in at least one of the turbines (8, 32) is sent to the medium-pressure column (2) of the double column (1); g) a cold booster (7) mechanically coupled to one of the expansion turbines (8) takes in air, which has undergone cooling in the exchange line (4), and delivers the air at a temperature above an intake temperature of at least one of the turbines (32; delivers the air to exchange line 4), and the air delivered by the cold booster (7) is reintroduced into the exchange line (4) in which at least one portion of the delivered air undergoes pseudo-condensation (interpreted as at least partial condensation; column 6, lines 5-10); h) at least one pressurized liquid (O2) coming from one of the columns (of 1) undergoes pseudo-vaporization (at least partial vaporization) in the exchange line (4) at a vaporization temperature (column 1, lines 60-65), and i) the turbine (32) not coupled to the cold booster (7) is coupled to a booster

(33) followed by a cooler (4); and, j) an intake temperature of the cold booster (7) is close to the vaporization temperature of the liquid (O2; since the intake to the cold booster 7 comes from the heat exchange line 4; column 4, lines 30-35).

Grenier (980) does not explicitly teach that the high pressure air is purified or a mixing column in which air from at least one of the turbines is sent. However, purifying an air stream prior to cryogenic treatment is standard practice in air distillation, further providing a further column in which mixing may occur is also standard practice for the purpose of separating further components such as argon. Such is taught by Grenier (142), who teaches that pressurized air is purified in apparatus (5; column 2, lines 44-45) and further teaches that an additional column (31) is provided, in which mixing occurs (inherent to disclosed column operation) and Argon is separated (column 4, line 63 - column 5, line 5). Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify the process of Grenier (980) with the purifier (5) and column (31) of Grenier (142) for the purpose of preparing air for cryogenic treatment to ensure reliability in the installation and for the purpose of separating argon for sale or use. Thus, the air sent to at least one (8) of the turbines (8, 32) upstream of the mixing column (31 of Grenier (142)) comes from the booster (33) and leaves the booster (33) at a pressure above the high pressure (column 6, line 6). Additionally, air expanded in at least one of the turbines (8, 32) is sent to the bottom of the mixing column (31-Grenier(142)), in order to participate in mass exchange therein (inherent to air sent to column 31 as disclosed).

8. **Claims 9-11** are rejected under 35 U.S.C. 103(a) as being unpatentable over Mostello (US 5,379,598) hereafter Mostello in view of Grenier (142). Mostello teaches a process for separating air by cryogenic distillation in an installation (Fig. 1) comprising a double air separation column (62), of which one medium-pressure column (64) operates at a medium pressure, and an exchange line (24, 22, 52, 14) in which: a) air is raised to a high pressure (via 12 or 18), and purified (via 16)*;* b) one portion of the stream of purified air is cooled in the exchange line (24, 22, 52, 14) and is then divided into two fractions (54, 32); c) each fraction (54, 32) is expanded in a turbine (56, 38); d) intake pressures of the two turbines (56, 38) are at least 5 bar above the medium pressure (column 9, lines 5-30); e) a delivery pressure of at least one (38) of the two turbines (56, 38) is substantially equal to the medium pressure; f) at least one portion of the air expanded in at least one (38) of the turbines is sent to the medium-pressure column (64) of the double column (62); g) a cold booster (34) mechanically coupled to one (38) of the expansion turbines (56, 38) takes in air, which has undergone cooling in the exchange line (24), and delivers the air at a temperature above an intake temperature of at least one (56) of the turbines (56, 38), and the air delivered by the cold booster (34) is reintroduced into the exchange line (24) in which at least one portion of the delivered air undergoes pseudo-condensation (at least partial condensation, column 7, lines 40-45); h) at least one pressurized liquid (O2) coming from one of the columns (of 62) undergoes pseudo-vaporization (at least partial vaporization) in the exchange line (24) at a vaporization temperature (column 8, lines 45-50), and i) the turbine (56) not coupled to the cold booster (34) is coupled to a booster (50) followed by a cooler (52);

and, optionally, j) an intake temperature of the cold booster is close to the vaporization temperature of the liquid (O2; see Figures 2-3; column 7, lines 1-10; "close" relative term not distinguishable in any absolute sense),

Mostello does not explicitly teach a mixing column in which air from at least one of the turbines is sent. However, providing a further column in which air is sent (and in which mixing may occur) is standard practice for the purpose of separating further components such as argon. Such is taught by Grenier (142), who teaches that an additional column (31) is provided, in which mixing occurs (inherent to disclosed column operation) and Argon is separated (column 4, line 63 - column 5, line 5). Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify the process of Mostello with the column (31) of Grenier (142) for the purpose of preparing air for cryogenic treatment to ensure reliability in the installation and for the purpose of separating argon for sale or use. Thus, the air sent to at least one (56) of the turbines (38, 56) upstream of the mixing column (31 of Grenier (142)) comes from the booster (50) and leaves the booster (50) at a pressure above the high pressure (from 12 or 18). Additionally, air expanded in at least one of the turbines (56, 38) is sent to the bottom of the mixing column (31-Grenier(142)), in order to participate in mass exchange therein (inherent to air sent to column 31 as disclosed).

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to John F. Pettitt whose telephone number is 571-272-0771. The examiner can normally be reached on M-F 8a-4p.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cheryl Tyler or Frantz Jules can be reached on 571-272-4834 or 571-272-6681. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/John F Pettitt /
Examiner, Art Unit 3744

/Cheryl J. Tyler/
Supervisory Patent Examiner, Art Unit 3744

JFP III
April 21, 2009